

Back TO Basics: Sample Collection & Handling



THE CITY OF
COLUMBUS
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DEPARTMENT OF
PUBLIC UTILITIES

What is QA/QC?

- QA stands for Quality Assurance
- QC stands for Quality Control
- Both are very important to the integrity of the sample data.
- Both start at the level of taking the sample.

Why is QA/QC Important?

- Without QA/QC the sample data is considered invalid.
- Ohio EPA require certain QA/QC be done on every sample that is collected for reporting purposes.
- QA/QC is covered not only in the lab analytical runs but also in the sampling technique out in the field.

Different Types of Sampling QA/QC

- Equipment Blank
- Field Duplicate/Split
- Trip Blank
- Field Blanks

Equipment Blanks

- There is usually 2 types of equipment used in sampling
- Composite samples using auto samplers
- Grab Samples using stainless steel buckets or cups to collect the sample.
- These are samples of deionized water that has been used to rinse sampling equipment in the field after collecting the daily sample and prior to starting a new sample sequence.
- It can also be described as a rinsate.
- It is useful in documenting adequate decontamination of equipment.
- It is collected after completion of the decontamination process prior to sampling

Field Duplicate/Splits

- Field Duplicates/Split samples are duplicate samples taken from the same container and analyzed independently.
- These are used to obtain the magnitude of errors due to contamination, random and systematic errors, and any other variability.
- Care must be taken to ensure that the samples are split in a way to ensure homogeneity.

Trip Blanks

- Trip Blanks are meant to detect any widespread contamination resulting from the container and preservative during transport and storage.
- Trip Blanks are solely for VOC (volatile organic carbon)
- The vials are filled by the analyzing laboratory with carbon free deionized water.
- Only 1 trip blank needs to be sent with each individual crew going out sampling VOC's for the day.
- Trip blanks remain unopened and just travel with the sampling crew and are brought back in the same manner as the normal samples.

Field Blanks

- Field Blanks mimic the extra sampling and preservative process but do not come in contact with ambient water.
- These are exposed to the sampling environment at the sample site.
- These provide information on contamination resulting from the handling technique and through exposure to the atmosphere.
- They are processed in the same manner as the associate samples (ie. Exposed to all the potential sources of contamination as the sample)
- To prepare blank pour deionized water into the pre labeled bottles and preserve like the samples.

QC Criteria for Samples

- Equipment Blanks-Contamination should not be greater than 10% of the MDL for any analyte selected
- Field Duplicates/Splits-If RPD of any set of samples is greater than 20% it might indicate a problem if the RPD is greater than 50% it is a definite problem
- Trip Blanks-For concentrations below 5 times the MDL the difference between the trip blank and sample shall not exceed the Reporting limit for concentrations greater than 5 times the MDL the RPD shall not exceed 10%
- Field Blanks-If there is contamination is should not be significantly greater in concentration nor occurrence than the laboratory method blank

What to do if QC not met for Equipment Blanks

- Go back through the cleaning process of the equipment and make sure everything is being done properly.
- Check the sampling methods, field logs, and equipment cleaning logs.
- Make sure training is up to date and that a refresher doesn't need done.
- The reporting lab should check their data to make sure its not a precision problem on their end.

What to do if QC not met for Field Duplicates/Splits

- Again review the sampling methods and field logs.
- Potentially going out in the field and watching how the splits are being done to see if it is a procedure problem. If it is more training will be required.
- Check with the reporting lab to make sure it is not on their end with precision and accuracy.
- A special evaluation might need to be done if nothing obvious is figured out.

What to do if QC not met for Trip Blanks

- First have the entire batch of samples reanalyzed.
- Depending on the impact to the data the samples might need to be rejected or qualified.
- The reporting lab should check their QA/QC to make sure its not on their end.
- The sampling methods and sampling logs need to be reviewed along with potential training.
- If it persists over multiple sampling events a intensive investigation needs to take place with remedial measures taken

What to do if QC not met for Field Blanks

- Priority here is to find the source of the contamination. With this sample there could be multiple area of contamination.(bottles, preservatives, DI water)
- Collecting and analyzing more laboratory blanks, equipment blanks, and filtration blanks to see if the contamination is across the board to narrow down where it has come from.
- Rejection or qualification of data may be required.
- You can not subtract the field blank results form the sample data.
- Again the Reporting lab should check its internal QA/QC
- All field sampling methods, logs and training need to be reviewed to find the source of the contamination

Frequency

- How often should QA/QC be done?
- It depends on the situation and requirements
- City of Columbus has 2 sample crews that collect samples 4 days a week
- The city gets a QA/QC set from each sampling crew once a week on a predetermined day of Wednesday
- The goal is to capture the entire sampling sequence and test per week and per crew

Ensuring Proper QA/QC

- There are a number of things that go into QA/QC that are not just about the actual sample.
- Chain of Custody
- Proper Sample Labels
- Proper Preservation on samples
- Sample Receipt and Sample check in

Chain of Custody

- This is a legally defensible document and the most important document that goes with the samples.
- The chain of custody needs to be filled out completely and accurately.
- Most chain of custodies have the same items on them
- Date and times of collection, location names or codes, the tests that need run, preservation, how many bottles per sample, contact information, sample matrix, what reporting requirements.
- Signatures of collectors and people receiving the samples with dates and times

Example of Chain of Custody

SKMBT_55215031714430.pdf - Adobe Reader

File Edit View Window Help

Open [Icons] 1 / 1 98.6% [Icons]

Tools Fill & Sign Comment

Sign In

▼ Export PDF

Adobe ExportPDF

Convert PDF files to Word or Excel online.

Select PDF File:

SKMBT_55215031714430.pdf 1 file / 331 KB

Convert To:

Microsoft Word (*.docx)

Recognize Text in English(U.S.) Change


Convert

► Create PDF

► Edit PDF

► Send Files

► Store Files



Chain of Custody Record

This is a legal document that authorizes Alloway to perform testing on samples submitted under this agreement.

○ 1191 North Cole Street, Lima, OH 45805
(P) 419-223-1342 (F) 419-227-3792

○ 1774 Marion-Wallico Road, Marion, OH 43302
(P) 740-389-5991 (F) 740-389-1441

○ 1602 W. Fourth Street, Mansfield, OH 44906
(P) 419-529-1641 (F) 419-526-5976

Report To: Melodi Clark
City of Columbus
1250 Fairwood Ave
Columbus, OH 43206

Phone #: 614-645-1239
E-mail: mtclark@columbus.gov

Project Name: MOR SVOC Surveillance Lab

Sampler: Melodi Clark

Invoice To (if Different): Melodi Clark
City of Columbus
1250 Fairwood Ave
Columbus, OH 43206

PO#: ED051452

Please Date the invoice 2/27/15

Notes/Comments:

Next Day Turnaround: (Rush Charges May Apply)

2 Working Days 3 Working Days Routine

5 Working Days

Customer Sample ID / Sample Location	Sample Date	Signatured Sample Time	Composite	Grab	Matrix Code	Number of Containers	Preservation Code #	Analysis Required	Alloway LIMS # For Lab Use Only
1									
2									
3									
4									
5									
6									
7									
8									

Relinquished by:	Received by:	Date	Time	Method of Delivery	Matrix Codes:	Preservation Codes:	Sample Receiving (For Lab Use Only)	
				<input type="checkbox"/> UPS <input type="checkbox"/> Fed Ex <input checked="" type="checkbox"/> Clerk <input type="checkbox"/> Alloway Pick Up <input type="checkbox"/> Alloway Sampling <input type="checkbox"/> Other	wv - wastewater gw - groundwater dw - drinking water sw - surface water w - water oil - oil s - solid sg - sludge l - leachate a - acid p - product o - other	1 - None 7 - Sodium Thiosulfate 2 - H ₂ O ₂ 8 - Ascorbic Acid 3 - H ₂ SO ₄ 9 - Malic Acid 4 - HCl 10 - EDA 5 - NaOH 11 - Ammonium Chloride 6 - H ₂ SO ₄ & H ₂ O ₂ 12 - (NH ₄) ₂ SO ₄ & H ₂ O ₂	13 - Zinc Acetate 14 - Sodium Sulfate 15 - Potassium Dihydrogen Citrate 16 - Sodium Sulfate/Sodium Bisulfate	Use Preserv? Y <input type="checkbox"/> N <input type="checkbox"/> Proper Preservation? Y <input type="checkbox"/> N <input type="checkbox"/> Container Temperature: _____
Received for Laboratory By: (circle one): Mansfield Lima Marion								

Transported to: Lima Marion By: _____ Received By: _____ Date: _____ Time: _____

Transported to: Lima Marion By: _____ Received By: _____ Date: _____ Time: _____

Sample Labels

- The Sample labels need to be complete and accurate.
- The idea is a chemist can take the bottle and without looking at anything else know exactly what they need to run
- The labels need to have sample id, preservation, type of test, date and time of collection and samplers initials
- The lab sample id number needs to be on the label if its pre logged in or the lab will put it on once they receive it.

Receipt and Logging of Samples

- When you deliver the samples to the lab the lab analyst will do a sample check.
- The check includes temperature, proper pH preservation, hold times, labels and chain matching up.
- Once all is verified then you need to relinquish the samples to the lab by signing and dating and the lab analyst will sign that they are receiving the samples from you.
- You need to keep a copy of the chain of custody with the signatures.
- The lab will keep the sample check list they use to make sure the samples are ok to be analyzed.

Field Data

- This is very important!
- pH, Temperature, observations
- All of these are items you take out in the field
- This determines if proper procedure was taken when collecting the samples.
- Other items sometimes looked at are conductivity, chlorine.
- This information stays with the sample collector some Labs will request the data to include on their final reports

Shipping Samples

- If you need to ship samples care needs to be take to ensure the integrity of the samples is kept in tact.
- Keeping samples cold is number 1 priority.
- Two methods of doing so are ice packs or bags of ice.
- The ice packs ensure no water leaking out of the cooler during shipping.
- Bagged ice can work as well but make sure you double bag it to ensure no leaking water
- **IF WATER LEAKS OUT THE SHIPPING COMPANY WILL MOST LIKELY NOT SHIP THE SAMPES!**
- Make sure the samples themselves are packed in an upright position.
- Any glass containers should be wrapped in bubble wrap.
- Fill out all the proper paper work the lab provided to ensure all the analysis is done correctly.

Shipping Samples Cont. Documents

- **Shipping Labels**
- Make sure the shipping address is correct and your address is correct.
- Make sure you have a contact name on the shipping label.
- Make sure you have marked the proper type of shipping you need most likely over night express to ensure the samples are still cold and a hold times are intact.

Shipping Samples Cont. Documents

- **Chain of Custody**
- This more important than ever! Since you will not physically be handing over the samples care needs to be taken to ensure the chain of custody is filled out completely and accurately.
- Sign the chain of custody relinquishing it to the lab they will sign it once they receive it and send you the copy of it with the final report.

Shipping Samples Cont. Documents

- **Field Data or other information**
- This is where the field data and any other information would definitely need to accompany the samples.
- This ensures the lab knows exactly what is going on with the samples.
- **LAST BUT NOT LEAST PUT ALL THE DOCUMENTS IN A SEALED PLASTIC BAG!**
- Attach the bag to the underneath of the cooler with tape.

Equipment Calibration

- Depending on what type of equipment you use the list could be different.
- pH/Temperature Meters
- Automatic Samplers
- Flow Meters
- These all need to be calibrated regularly to ensure proper quality control if these are not working properly then the samples are no good.

Calibration of pH/Temp Meters

- These meters should be calibrated daily before going out into the field.
- Follow your SOP on how to calibrate.
- Fresh pH solutions should be used each day and discarded at the end of the day.
- Recalibrate the meter at each new sampling location to ensure the meter didn't lose the calibration.
- Record these daily calibrations in a field log book with the date and times of each calibration.
- If the meter will not calibrate do not use it. You may have to send the meter out for service.
- Always have a back up meter for these cases so you will have one to use while the other one is getting fixed.

Calibration of Auto Samplers

- The samplers need to be calibrated daily.
- Use your SOP or Manufacturer Manual on how to calibrate your specific Auto Sampler.
- Perform a new calibration at each new facility you take it to.
- This ensures the sampler didn't lose calibration.
- Check all the tubing make sure the tubing doesn't need replaced.
- Make sure the proper tubing is being used at the particular location you are at.

Calibration of Flow Meters

- This need to happen daily before going out into the field.
- Once at each location it needs to be rechecked.
- Follow SOP or Manufacturer Manual on how to Calibrate.
- If it won't hold calibration it may need to be sent it to have service done on it.
- Have a back up for these instances.

Cleaning of Equipment

- This is another key component to ensure proper QA/QC in the field.
- Equipment (samplers, tubing, pump tubing)
- Collection Sample Containers (buckets, cups)
- Coolers

Equipment Cleaning

- Sampler cleaning- The case can be cleaned with soap and water.
- The sampler head can be cleaned the same way as long as the connector terminals are covered.
- Tubing- Vinyl tubing should not be re used after sampling.
- Pump Tubing should be medical grade do it doesn't contain organics. Inspect it for wear and tear.
- Pump Tubing- Rinse tubing in hot water for about 2 minutes

Equipment Cleaning Cont.

- Use soap Liqui-Nox, Alconox, or Citranox. Make sure what ever soap you use it does not contain phosphates.
- Rinse the tubing with the 2% soap solution for about 2 minutes
- Rinse with hot water for 2 minutes
- Final step is to rinse with DI water

Collection Sample Container Cleaning

- Plastic (Polyethylene)- wash with hot water and 2% soap solution (liqui-nox, Alconox, Citranox) for 2 minutes
- Rinse with acid (nitric for metals) I would recommend nitric
- Rinse with tap water
- Finally rinse with DI water 3 times

Collection Sample Container Cleaning Cont.

- Glass-Wash with hot water and 2% soap solution (Liqui-Nox, Alconx, Citranox)
- Rinse with a solvent (acetone, isopropanol or methylene chloride) for extractable organics
- Rinse glassware for volatile organics with isopropanol.
- Rinse with tap water
- Rinse with DI water 3 times
- Dry in contamination free oven

Coolers

- Wash the outside and inside of coolers daily.
- Wash with hot water and the 2% soap solution (Liqui-Nox, Alconox, Citranox)
- Rinse with tap water.
- Prop open and let air dry
- A dirty cooler can introduce contamination to the samples

Recycling

- Teflon Tubing, pump tubing and composite sampling jugs should be recycled for more use in sampling.
- All other containers and tubing should be thrown away.
- If possible on reusing of sampling containers have the lab clean them to ensure proper levels of qa/qc are reached and no contamination will be introduced to the samples.

Recap

- QA/QC Starts at sampling
- There are 4 types of QA/QC- Field Blanks, Trip Blanks, Duplicates/Splits and Equipment Blanks
- There are specific criteria that need to be met per type of QA/QC for the samples to be considered valid
- Steps need to be taken when criteria are not met to determine what the problem is

Recap

- Frequency is dependent on your specific operation
- Many items factor into good quality samples ex. (chain of custody, labels, proper preservation, and sample receipt)
- Documents need to be accurate and complete
- Calibration is very important.
- Cleaning of equipment and supplies is very important.

Final Thought

- Good Quality Lab data starts in the field.
- If the lab is given a bad sample that wasn't handled right the data is going to be bad.
- The lab can't make magic happen and change the way the sample is if it wasn't collected properly with the proper QA/QC.
- **QA/QC STARTS IN THE FIELD!**

Questions?

- Questions?
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